21 MICROSCPECTROPHOTOMETRY (MSP)

21.1 Microspectrophotometry (MSP)

21.1.1 Objectives

Through completion of this module the trainee will have developed and demonstrated theoretical knowledge and/or practical skills to:

- Explain the history and use of MSP;
- Define and explain MSP terminology;
- Apply techniques for obtaining reproducible MSP data using the S.E.E. instrument; and,
- Interpret MSP data and articulate the significance of an MSP match.

21.1.2 Required Readings

21.1.2.1 Adolf, Franz-Peter and Dunlop, James, "Microspectrophotometry/Colour Measurement", Robertson J. and Grieve M., ed(s), Forensic Examination of Fibers, 2nd ed., Taylor & Francis, Inc., Philadelphia, PA, 1999, pp 251-289.

21.1.2.2 Berns, Roy S., Principles of Color Technology, John Wiley and Sons, NY, 2000, pp. 3, 7-14, 27-29, 82-83, 88-91, 199-200.

21.1.2.3 Gaudette, Barry D., "The Forensic Aspects of Textile Fiber Examination", Saferstein, R., Forensic Science Handbook, Vol. 2, Prentice Hall, Englewood Cliffs, NJ, 1988, pp. 245-248.

21.1.2.4 Grieve M., Dunlop J., Haddock P., "An Investigation of Known Blue, Red, and Black Dyes Used in the Coloration of Cotton Fibers", *Journal of Forensic Sciences*, Vol. 35 (2) March 1990, pp. 301-315.

21.1.2.5 Houck, M., FBI Laboratory, Handout, "Color Analysis of Textile Fibers".

21.1.2.6 Martin, P., "Instrumental Color Analysis in Forensic Science", S.E.E. Incorporated, American Academy of Forensic Science, Feb. 2000 Meeting, Reno, NV.

21.1.2.7 Menold, R., FBI Laboratory, Handout, "Color Analysis and Spectrophotometry", American Academy of Forensic Science, Feb. 2000 Meeting, Reno, NV.

21.1.2.8 S.E.E. Incorporated, Handout, "Microspectrometers: Theory, Design, and Use". (~Paul Martin, 11/5/98)

21.1.3 Questions

The trainee will provide written answers to the following questions:

- Define the following:
  - Color, visible spectrum
  - Dark scan
  - Detector array spectrophotometer
  - Didymium
  - Fluorescence MSP
  - Holmium oxide
  - Interference filter wheel spectrophotometer
  - Metameric pair
  - MSP
  - Reference scan
  - Reflectance MSP

- Sample scan
- Spectrophotometer
- Transmission MSP
- uv MSP
- vis MSP

- What are the components of a microspectrophotometer?
- Can MSP be used to identify dyes? Why or why not?
- What colors are poor candidates for analysis by MSP?
- Discuss light absorption versus light transmission.
- What is required prior to casework using MSP?
- What are matching spectral characteristics and what are exclusionary spectral characteristics?

21.1.4 Practical Exercises

21.1.4.1 The trainer will demonstrate the QC checks and how to obtain MSP spectra.

21.1.4.2 The trainee will perform the QC checks and obtain MSP spectra while being observed/assisted by the trainer.

21.1.4.3 The trainee will be provided with a set of fifteen (15) microscope slides that contain homogeneously colored fibers. These microscope slides are stored in the Central Laboratory MSP work area. The trainee will obtain and print at least one spectrum from at least one fiber on each slide.

21.1.5 Evaluation

21.1.5.1 The trainer will review the written answers to the questions with the trainee.

21.1.5.2 The trainer and the trainee will review and discuss the pertinent points of each of the required readings.

21.15.3 Review of practical exercises.

21.2 Competency Evaluation and Mock Trial

The fiber trainee will use MSP when completing their subdiscipline competency test and will defend their results as a part of their mock trial in that subdiscipline.

All other users will receive an e-mail from the trainer stating that they may independently perform analysis using the MSP.

21.3 Reading List

21.3.1 Berns, Roy S., Principles of Color Technology, John Wiley and Sons, NY, 2000.

21.3.2 Grieve M., Dunlop J., Haddock P., "An Investigation of Known Blue, Red, and Black Dyes Used in the Coloration of Cotton Fibers", *Journal of Forensic Sciences,* Vol. 35 (2) March 1990, pp. 301-315.

21.3.3 Houck, M., FBI Laboratory, Handout, "Color Analysis of Textile Fibers", no date.

21.3.4 Martin, P., "Instrumental Color Analysis in Forensic Science", S.E.E. Incorporated, American Academy of Forensic Science, Feb. 2000 Meeting, Reno, NV.

21.3.5 Menold, R., FBI Laboratory, Handout, "Color Analysis and Spectrophotometry", American Academy of Forensic Science, Feb. 2000 Meeting, Reno, NV.

21.3.6 Robertson, J and Grieve, M., Forensic Examination of Fibers, 2nd ed., Taylor & Francis, Philadelphia, PA, 1999.

21.3.7 Saferstein, R., Forensic Science Handbook, Vol. 2, Prentice Hall, Englewood Cliffs, NJ, 1988.

21.3.8 S.E.E. Incorporated, Handout, "Microspectrometers: Theory, Design, and Use". (~Paul Martin, 11/5/98)

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